

**A NON-THERMAL PLASMA REACTOR HAVING
INDIVIDUALLY RETAINED POSITIVE AND
NEGATIVE REACTOR PLATES**

ABSTRACT OF THE DISCLOSURE

A non-thermal plasma reactor and method provides individually retained reactor plates. The method for preparing the non-thermal plasma reactor comprises stacking an alternating sequence of positive and negative reactor plates to form a reactor stack, placing temporary spacers between the positive and negative reactor plates. In a first embodiment, a ceramic insulating layer is disposed on each side of the stack, folds of the ceramic insulating layer extending between plate pairs. The temporary spacers are removed and the stack is compressed. The reactor is wrapped with a retention material, and suitable electrical connections are applied to the plates. The wrapped stack is inserted into a reactor housing, and the necessary electrical and inlet-outlet connections are made. In this embodiment, the reactor plates are secured by the retention material and the folds of the ceramic insulating layer.

In a preferred embodiment, the temporary spacers have a thickness selected to provide adequate space for accurate insertion of a permanent pleated insulating separator. Preferably, the permanent pleated insulating separator comprises a pleated mica separator, prepared by folding a mica sheet into a series of pleats. The permanent pleated separator is disposed on each side of the reactor stack, with one pleat inserted between each opposing polarity pair of plates.

In a third embodiment, an alternating sequence of positive and negative pairs of reactor plates are stacked to form a reactor stack having exhaust gas passages defined between opposing pairs of plates, using temporary spacers between opposing polarity pairs of said positive and negative reactor plates to support the stacked plates during preparation. A

retention material, such as a ceramic fiber retention mat, is disposed about the stack. In this embodiment, permanent support for the stacked plates is supplied from the retention mat, which, upon compressing, extends slightly
30 into the exhaust gas passages at each side of the stack.

The non-thermal plasma reactors provide ease of manufacture at reduced cost due to the elimination of costly permanent ceramic spacers and the elimination of edge assembly retention with glass cement. In the preferred embodiment, the plates are secured by the retention material and additional
35 spacing and support function is provided by the permanent pleated mica separators. The reactor eliminates the problem of thermal cracking by allowing each plate to expand or contract freely.